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NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS FOUNDED 1934

JUNE, 1947

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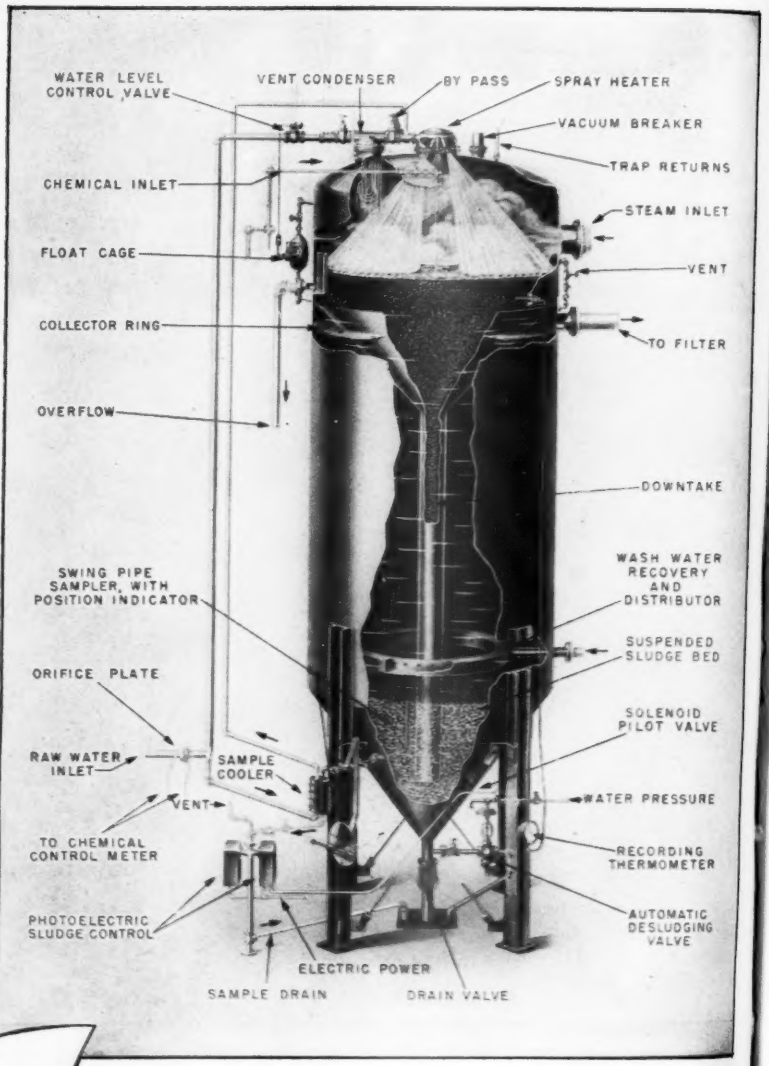

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WATER CONDITIONING HEADQUARTERS

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Fire Prevention Activity Gains Momentum

Fire—man's best friend; man's worst enemy—made serious inroads on the peace and tranquility of numerous communities several months ago. Headline after headline told of serious loss of life and property as a result of its ravages. In fulfilling the public duty of the engineering profession, NSPE issued a "call to arms" which was answered by engineers throughout the nation. An intense fire prevention program got under way. The President of the United States then stepped into the picture and appointed his conference on fire prevention, thus adding impetus to the movement which was already showing signs of success in various states. Much has already been accomplished—as is shown by the following report—but much work still remains to be done.

By Milton F. Lunch
NSPE's Legislative Analyst

A number of months have passed since the entire nation was horrified by a succession of "headline" fires that took a heavy toll in life and property. Although the recent spasm of hotel and public building conflagrations has subsided, Fire, The Enemy, is ever present and may, at any moment, erupt again to cause untold death and destruction. That is, unless Man makes continuing efforts to conquer this age-old enemy.

The purpose of this report is not to state that the Member State Societies of NSPE through their struggle against the causes of fires and their insistence of fire-prevention action have achieved complete success—for complete success can never be attained in this work—but rather to report what has been done in recognition of the duty imposed upon Professional Engineers.

Georgia Acts Quickly

If emphasis was needed to motivate the Professional Engineers of the nation in this cause it was dramatically supplied last December, when during the 12th Annual Meeting of NSPE in Atlanta the appalling Winecoff Hotel fire impressed upon the mind of every Professional Engineer in attendance the necessity for drastic and immediate action. Since that time the organized attack on fire causes has been doubled and re-doubled by the State Societies of NSPE.

With both speed and determination the Georgia Society formulated immediate plans to prevent a repitition of the disaster. Even before the State's General Assembly convened in January the Society offered its full cooperation to members of the Legislature and particularly to the Hon. Charles L. Gowen, who had been delegated by the Governor to draw up legislation to promote safety from fire.

The Georgia Society appointed the strongest Committee possible, consisting of its most experienced engineers and drew in help from the American Institute of Architects and other experts in the fire-prevention field. The Committee held several meetings with the legislators preparing the law and were requested finally to draft the legislation to be offered. This draft, with the addition of some legal terminology, was used almost verbatim in the final legislation, known as the Cowon Bill, which has been adopted and is now the law of Georgia. Its sponsors have high hopes that it will do everything that laws can do to prevent future fire tragedies.

Milton F. Lunch

The new law establishes control over existing buildings as well as proposed buildings by requiring a certificate of occupancy. It covers substantially all buildings for public occupancy and is definitely *not* limited to hotels. The administration is based on a Safety Council consisting of seven members and several ex-officio members. Of the seven, the majority are to be either registered engineers or registered architects. In addition there is provided a Director of Public Safety.

Every building owner is required to obtain a Certificate of Occupancy which can be secured only after inspection and report by a registered engineer or architect. The basis of approval will be the Building Exits Code of the National Fire Prevention Association. The Safety Council is charged with the responsibility of bringing before the General Assembly convening in January of 1949 any suggested amendments to improve the operation of the Act and also to stiffen the requirements of Safety Occupancy Permits beyond even those requirements now set forth in the National Exits Code.

The Georgia Society has taken steps to insure that the personnel of the Safety Council represent the highest caliber persons available and to secure the appointment of an outstanding man as Director of Safety.

R. I. Society Calls for Action

Immediately following the call of NSPE for State Societies to act, the Rhode Island group communicated to their Governor an offer of cooperation and concrete suggestions for improving fire-safety conditions in "Little Rhody.' The Society pointed to the Winecoff fire as showing "the dire need for immediate and positive action by government officials, engineers and civi-minded groups to put an end, once and for all, to the seemingly unending series of flaming holocausts." The Rhode Island Society called upon the Governor to rally public opinion in the State to the end that a solution of the problem be finally sought and effectuated.

It was recommended that in view of Rhode Island's being a small and compact state the safety of life and prop-

(*Continued on page* 14)

The Professional Engineer And Future Trends

Dr. Rupen Eksergian, consulting engineer and noted teacher, analyzes future probabilities on the basis of current trends. He relates these to the qualities which will be looked for in engineers of the future and some of the problems with which they will have to cope.

By Dr. Rupen Eksergian

It is perhaps presumptuous to anticipate for the near future the particular demands, the nature of service and the corresponding qualifications of the Professional Engineer. It has been my experience, however, that progress can best be attained rather by sincere application to specific problems than too much philosophizing on the future.

While the type of jobs varies enormously in the engineering profession, they may be classified into groups. By following their individual trends, we may obtain some idea as to the nature of their future trends. At the same time it is exceedingly important to maintain a perspective and to acquire a general basic knowledge in a given field beyond the particular job, in order that one may qualify for leadership in the advancement of the work itself.

Classification Development

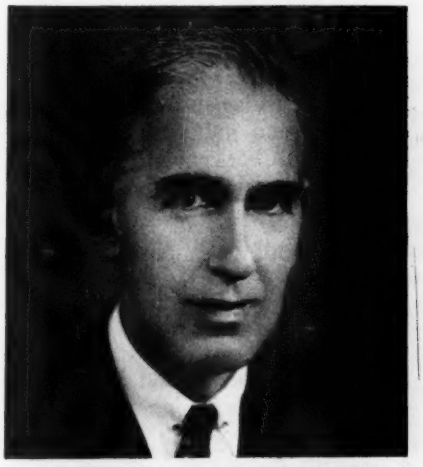
For a long time the engineering profession has been divided into civil, mechanical, electrical, chemical and sanitary engineering, with additional activities in naval architecture, marine engineering, aeronautical engineering, metallurgy and the engineering phase of architecture. The curricula of these various subjects are so well known that a discussion is unnecessary.

A departure from the curricula of orthodox subjects to the field of Economics and Management possibly started in Civil Engineering when Wellington published his famous treatise on the Economics of Railway Location, and was followed in Mechanical Engineering with the work of Taylor in Principles of Scientific Management. The engineering economics of the power field followed in the electrical field, with such leaders as D. C. Jackson, and others. Thus a new field of engineering economics and scientific management has been established, the principles of which are now recognized to be quite independent of the classified curricula of orthodox engineering professions previously mentioned.

Industrial Engineering

A very large field in engineering applications is associated directly with shop practice, process work and fabrication methods. It may be termed industrial engineering. It is closely associated with mechanical, electrical and chemical engineering in their applied phases and in the machine shop curricula.

A little closer analysis will show, I believe, that the industrial engineer really requires a further background in industrial management, coupled with an understanding of elementary scientific principles, both in engineering physics and chemistry, and some specialization in shop practice, process work and fabrication methods. This field, therefore, is a combination of economics and management with the physical sciences, including shop practice and process methods. The latter includes a background of a group of component subjects such as welding methods, practical metallurgy, plant layout, chemical processes and shop practice methods.



Dr. Rupen Eksergian

Dr. Eksergian is consulting engineer for the Budd Company in charge of stainless steel development and trains. He played a part in development of the Pioneer Zephy.

Design Engineering

We now come to a field which is more closely associated with straight engineering along the orthodox curriculum. This may be termed design engineering. The late Professor Peabody, at The Massachusetts Institute of Technology, was approached as to the advantages of his course in naval architecture versus electrical engineering. Being an honest engineer (as we presume all engineers are), he stated that if a man had the qualifications to design a motor, he could likewise design a ship. It is to be noted one is an electrical problem and the other a structural problem, requiring a different physical science background from the point of view of our orthodox engineering curriculum. Another, an eminent locomotive designer in the railroad field, was infleunced in important locomotive machine details by marine engineering practice. It is not difficult to list many notable designers who have been successful in going from one field in engineering design to another. We may define the design engineer as the architect of the engineering profession, and this love of good design proportions must lead all other qualifications. The educational requirements in his work, however, I believe require a more extensive technical background than the management and industrial engineers. In the first place, actual requirements for a design engineer vary considerably. We have two extremes, namely, one the purely architectural phase and the other the technical phase.

Technical Process

Beyond the architectural phase of design engineering, and closely allied, is the technical process engineer, who is associated with the design of unit process apparatus and machinery. This work not only includes design, but experimetnal developments in flow problems, in combustion and metallurgical applications, all requiring a considerable technical background in laboratory technique.

The increased demand of analysis in design has led to the analytical design engineer. In some cases he poses as the head of the analysis group, cov-

(*Continued on next page*)

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ering stress, vibration electrical circuit and theremodynamic analysis. In other cases he operates from experimental data and translates it into design formulae. The field of the analytical design engineer is increasing due to scientific trends in design. Obviously this field is needed more in certain lines of engineering, such as in engine, turbine and electrical machinery design, engineering accoustics and electrical transmission problems.

The qualifications of an analytical design engineer require a good background in general physics, together with a certain facility in mathematical analysis, at the same time he must maintain a balance of architectural design proportions, along with shop practice limitations, so that his work may be effective.

Research and Development

The next group of engineers are specifically engaged in engineering science research. Most industrial corporations are now feeling the need of introducing a certain amount of specific research work. The research phase of engineering will undoubtedly increase in the near future.

Obviously the extent of research in industry is dependent on the nature of the product itself. The marketing of certain products requires an increasing background of purely scientific applications, coupled with long range vision, in order that the fundamental approach in certain developments may be attained.

The qualifications for the coming research engineer require a basic scientific attainment which may be listed as engineering science, which includes basic physics and mathematics, extending to quantum mechanics. He must also have laboratory technique and experience. In some work more emphasis would be placed on the chemical phase of engineering, which in turn would require a basic background in physical chemistry.

One of the greatest difficulties in the extension of useful research in industry, is the necessity for having this work coordinated closely with design and actual process developments. In order to make this field more effective, the research engineer has frequently extended his field to complete unit process small scale plants, or in an actual pilot design. After the completion of this preliminary development, the work is handed over to the design and process engineer.

Coordination of Groups

In the previous discussion it has been pointed out that the field of engineering subdivides quite clearly into the following groups, namely,

(1) Scientific management and engineering economics.

(2) Industrial and process engineering.

(3) Design Engineering

(a) Architectural phase of design.

(b) Analytical design.

(c) Manufacturing and process design.

(4) Research and Development.

(a) Analytical.

(b) Experimental.

(c) Development.

To bring these groups together requires effective cooperation, with proper management. It is obvious that no one person can be expected to qualify directly and in detail, in the various component subjects. However, a certain type of leadership is needed in order that this work may be coordinated from an overall point of view. To begin with, to coordinate this work requires first of all a broad appreciation of the component elements listed, as well as the products themselves. Second, it requires the qualifications of leadership.

Leadership Defined

Leadership can be more or less defined as good judgment, with honesty of purpose backed by a clear understanding of the particular requirements for the work, coupled with those qualities which encourage progress in both work and attainment, and the ability to carry out a project to its completion.

For guiding industry as a whole, an overall type of leadership is required. This is best met with a knowledge of scientific management, engineering economics and industrial and process engineering. For guidance in manufacture, industrial and process engineering with appreciation of design, engineering is needed. For guidance in overall engineering, leadership with greater specialization is required, as listed under design engineering with appreciation of research and development. Finally research and development is becoming of increasing importance in industry. This requires the guidance by a capable leader with real scientific qualifications.

Therefore, to sum up, leadership in an organization requires:

(1) Overall qualifications of basic scientific principles and a balanced point of view of the engineering subdivisions previously listed, with relation to the product itself.

(2) The ability to carry a project through to completion and to coordinate the various component details.

(3) Good engineering judgment and a broad perspective of the work.

Directing the Work

Now we come to probably the most important aspect of a successful engineering organization, and that is the choice of the engineers who are to be responsible for directing the work of the various groups. They may be listed either as foremen, or group leaders in a particular field, directing given groups, or as project engineers at large on definite projects, who in turn coordinate the work of others.

The importance of a group leader, foreman, or a project engineer, cannot be overemphasized. It is something like an orchestra in which the distribution of excellent players in the first and second violin sections, the cello section, and among the woodwinds, reacts to improve the quality of the entire orchestra. In fact a good conductor faces a hopeless task in getting effective results from an orchestra if he has only mediocre players without effective group leadership. It is important to point out that while the application of engineering to industry requires coordination, on the other hand it is equally important that leadership and guidance of engineering groups bring out useful individualism among the junior engineers.

The ability to guide a group of men to attain higher scientific qualifications and to coordinate judgment with experience in the successful carrying out of individual projects, is a most important work. It has also been my experience that promoting interest in the work itself requires the placing of real responsibility on individuals along with qualified and matured scientific guidance.

Engineering Education

The position of the Professional Engineer in the future depends in no small degree on his training and his progressive attitude toward scientific education.

It is usually assumed that technical training is completed at the end of the school curriculum. Actually it has just begun. Education continues throughout a successful engineering and scientific career. I have often remarked that at least one third of one's work should be devoted to study. This should never be neglected. The fruit of serious study offers a real stepping stone to scientific progress. It is im-

possible to advance in the scientific phase of engineering without it.

Education can never be planned with a prescribed assignment. Ideas and a grasp of fundamentals are usually difficult to get and we receive them only after much study in jagged steps. Gradually the overall conception develops, and this occurs only after many years of diligent concentration in a given field.

Cooperation With Schools

With the increasing demands of scientific qualifications in the entire engineering field, I am convinced a new type of cooperation with the schools is needed. First, I believe graduate work, particularly for the Doctor's Degree should be encouraged only for matured students with a long background in succesful research or in analytical design. The qualifications required for advanced degrees, should be based on a definite scientific attainment in the form of research in a field and a broad background of basic scientic subjects. The important feature in this work, however, is the paralleling of one's professional work in industry with a certain scholarly aspect of his profession. It is necessary for schools to accommodate themselves to meet this condition.

This raises the question of what type of training is needed for the future trends in engineering. Curiously enough, it is not necessary to state these trends to answer the requirements. An engineering education should only be on fundamental and basic scientific subjects. Obviously these will differ according to the type of engineer—whether he is in research, design, or in industrial and process engineering.

Physics and Chemistry

For the scientific aspect of engineering, it seems quite clear that the subjects should follow quite closely those subjects associated in the field of applied physics and chemistry. This would include a basic course in mathematics, including the Calculus, in mechanics and dynamics and electrodynamics, in fluid flow, hydrodynamics, elasticity and plasticity; in thermodynamics and physical chemistry, with special courses in electronics, accoustics and vibrations, followed by an elementary background in quantum mechanics and wave theory. The engineer's background in these subjects, while maintaining a clear grasp of the fundamental physical principles, requires a somewhat different aspect from that of even the applied physicist. Unfortunately, it seems to me that neither the present training of the engineer or that of the physicist meets the requirements in the technical field of engineering for future work. The engineer's training is completely overloaded in so-called professional subjects, such as in the design of a bridge, the design of an airplane, or in the design of a turbine. On the other hand, the present day physicist is quickly ushered into electronics, nuculear physics and the like, without the long background of classical physics which more nearly meets the requirements for the future scientific engineer. It is believed the curriculum on scientific subjects in our engineering schools needs a new development for the scientific engineer and requires fully as much a basic course as that for the theoretical physicist.

Engineering Science

For the design engineer, with emphasis on the design phase, the training may be more nearly in accord with a simplified combination of basic courses in our present day engineering curriculum. It should, however, combine the essential subjects in civil, mechanical and electrical engineering, all in one basic course; namely, engineering science.

For the industrial engineer, a further combination and simplification would include chemical engineering and metallurgy.

The present day professional course system including professional practical subjects which often must be relearned in industry, I believe should be discouraged.

Future Subjects for Development

It seems safe to predict that the expansion of our country will be greatest in the field of science and engineering. Instead of the advice, "Go West, young man," the future slogan for opportunities might be, "Go Engineering, young man," or "Be a Scientist, young man."

While new developments will occur, possibly a huge expansion in the chemical process field, a very great opportunity will be in some of our own back yards, namely, in new points of view applied in old fields. For instance, the railway field offers unique expansion in highly technical work; in the replacement of steam locomotives with Diesel locomotives, and later the gas turbine locomotive and in the dynamics of the tracking of vehicles.

Automobile Changes

The entire automobile field may change materially with the advent of a compact gas turbine power plant and electric drive. The increasing applications of turbine design to many fields, including the aeronautical field, together with jet propulsion, has placed new emphasis on complex thermodynamic problems connected with the flow of gasses at high temperatures. It also has placed a new aspect on the physical properties of metals at high temperatures. It opens up a further field in heat transfer and temperature stress analysis.

While much thought has been placed on fabricated houses, I believe the architectural phase puts more emphasis on artistic and somewhat individual dwellings. For this reason, it seems that the engineers' field in the building game is rather on the planning and design of important component parts, such as the frame bents, structural connections, window frames, etc. There is a huge field of technical standardization for these components, which would facilitate building constructions, while at the same time givinfi freedom for architectural conceptions.

Interior equipment of homes offers some interesting opportunities. I believe reversed refrigeration as a means of heating homes offers a unique combination of cooling in the summer and heating in the winter. It is recognized the capacity of the apparatus becomes large when trying to heat for severe winters and that to maintain a base temperature to the evaporator is difficult. However, reversed refrigeration will probably be applied particularly in climate regions with mild climates.

Process Development

Engineering problems in the chemical field occur in process developments, as in the refining of oils, the various synthetic processes, as in the catalytic conversion of nitrogen-hydrogen 3:1 mixtures into ammonia; the paper industry; the rubber industry, and in other chemical products. We have unit process apparatus, such as agitators, autoclaves, ball mills, heat transfer units, steam roll driers and pipe line mixing. Such problems require fluid flow analysis, with complex thermodynamic relations, heat transfer and film theories, as well as machine design and structural problems.

A very important field in the engineering of chemistry is along the lines of high pressure technique, with operations in catalytic flow circuits at 1,000 atmospheres — such include hyper-compressors, injectors, etc.

(*Continued on page* 12)

Legislative Committee's Monthly Report

It has been said by at least one competent observer that 80 per cent of the legislation introduced in the United States Senate and House of Representatives concerns engineers in one way or another. Thus, the professional engineer has a large stake in seeing that proper legislation is passed. Your comments on these monthly legislative reports are invited.

By Ray M. Fuller

Legislative Committee Chairman

Dear Fellow Member:

Last month we reported to you in this column that the Legislative Committee had been giving consideration to the Advance Planning Program of the Federal Works Agency which will expire this coming June 30th. Since that time a definite move to continue the program has taken place in the form of a bill in the House of Representatives by Representative Frederick A. Muhlenbergh, (R., Pa.) who is an architect and has held several engineering positions in his pre-Congressional career.

Some slight changes would be made from the present program, but essentially the bill authorizes a continuation of the program now in force. Instead of apportioning the money advanced in the ratio of 90 per cent according to the population of the several States and 10 per cent at the discretion of the FWA Administrator, Mr. Muhlenbergh would revise these figures to 75 per cent according to population and 25 per cent at the discretion of the Administrator. The project for which the loan or advance is made would have to be approved by appropriate State, local, or regional authority. If only a part of the project is constructed the repayment would be in the same proportion to the total advancement as the estimated cost of constructing that part of the project. The bill authorizes $50,000,000 per year ot carry out the program.

The Legislative Committee is now conducting a referendum on this measure to determine the views of our members as to the position that NSPE should take.

National Science Foundation

As was generally anticipated the Senate has approved the creation of a National Science Foundation by the lopsided vote of 79 to 8 and has sent the bill to the House where more difficulty is expected in obtaining approval. A referendum conducted by the Legislative Committee shows strong support for this legislation and NSPE will support the bill in the House.

A number of amendments were adopted by the Senate before passage, among which was one requiring that 25 per cent of the money appropriated for the Foundation must be apportioned among the States with two-fifths of that amount in equal shares and the remaining three-fifths according to population. The funds granted the States would have to be used to carry on research activity in the facilities of tax-supported colleges and universities (including land-grant colleges) and the projects would have to be approved by the Foundation. Another amendment provides a Director as the primary administrative head of the Foundation, who will be appointed by the President after receiving the recommendations of the Executive Committee. The bill adopted by the Senate retains the 24-member part-time policy group who must be "recognized leaders in the fields of the sciences, engineering, education, or public affairs."

Engineering Research

The engineering research will be directed by the Division of Mathematical, Physical, and Engineering Sciences with the advice of a Divisional Committee composed of not less than five members. The Office of Scientific Research and Development is abolished, being succeeded by the Foundation. The National Roster of Scientific and Specialized Personnel of the Department of Labor is transferred to the Foundation to continue its work. Current talk indicates that the initial appropriation for the Foundation, if it passes the House, will be in the neighborhood of $20,000,000.

During the course of the debate in the Senate on accepting the amendment providing 25 per cent of the money must be aportioned to the States, it was interesting to note that both sides made extensive use of statements and telegrams from the heads of engineering schools throughout the country. If conclusions could be drawn from the statements and telegrams of the engineering educators it would appear that the majority favored the 25 per cent provision and were unanimous in the view that the bill must pass whether or not the amendment was adopted.

NSPE Support Revised Bloom Bill

Those who followed the legislative situation in the last Congress will recall the so-called "Bloom Bill" which would have authorized the Federal Government to supply engineering services to foreign nations. This bill met the united opposition of the profession and failed to pass. A similar bill has been greatly revised to meet the objections of the profession and is being rushed through Congress as fast as possible inasmuch as it also contains an authorization for the continuation of radio programs to foreign nations.

The new bill contains specific safeguards against competition by the government with private engineers by providing that, " . . . such services shall not include the construction of public works or the supervision of the construction of public works . . ."

NSPE is supporting this measure, listed as a "must" by Secretary of State Marshall, with the recommendation that the safeguards be enlarged to include a prohibition against plans and designs, as well as construction and supervision of construction. The new bill has already been approved by the House Committee and is expected to win House aproval shortly, after which it will go to the Senate.

Cordially yours,

Ray Fuller

Ray M. Fuller.

Unity Is Possible For Professional Engineers

Engineers can take pride in their technical development—but professional advancement is another matter. Marvin C. May, assistance professor of civil engineering, University of New Mexico, makes some observations from his experience.

By Marvin C. May

The American engineer can take great pride in his technical accomplishments. Working as an applied scientist, building and producing for his country, he has achieved a success that is the envy of the entire world. His work has made possible the highest standard of living ever known. He has freed man from the necessity of deadening physical drudgery.

Today one American workman, with the help of the engineer, can do the work of a thousand slaves. No country in history has even remotely approached the productive effort of the United States during the last war. In what has been called an "Engineer's War," victory was dependent to a great extent on an industrial capacity, built and operated by engineers, and on the construction miracles performed by other engineers at, or near, the fighting fronts. The American engineer has served his country well, and his technical works have been of benefit to all mankind.

Professional Position

Professionally, however, the progress of the engineer has been much slower. He is still, in the mind of the public, a locomotive driver or an equipment operator.

Professional recognition is not a matter of opinion of the practitioners of the profession, but is based on public recognition. If this were not so, the number of "professions" would quickly equal the total number of all vocations. What we call our vocation is unimportant. It is the respect and recognition of the thinking public that matters. No engineer can honestly claim that engineering is now on the same professional plane as law and medicine. So far, we have definitely failed to achieve the professional recognition that our technical progress and great public service justifies.

Engineering is a complex physical science and, as in every complex field, technical progress can be obtained only by specialization. The body of knowledge is simply too large to permit any one man to become well versed in all its details. This specialization is reflected in our college degrees where, instead of all receiving the same basic degree as in law and medicine, we have at least twenty-five different four-year engineering degrees. As new specialties have arisen we have added new degrees until it might seem every individual student has his own personal degree.

Another outgrowth of this specialization is the presence of numerous engineering societies and organizations, some seventy in all, each devoted to a relatively narrow field of engineering. These organizations can be likened to branches on a tree. The only trouble is that in engineering we have the botanical curiosity of a tree with many sturdy branches but no trunk or roots.

This lack of an integrating agent, or organization, is immediately obvious if we compare our professional organizations with those of the medical profession. While the doctors have, as we have, a number of technical organizations devoted to various specialties, they also have one all-encompassing association that includes all doctors, regardless of their specializations, in an organization devoted not to technical matters, but to strictly professional, economic, and social problems. Engineering definitely needs such a unifying organization if it is going to progress professionally.

Marvin C. May

Assistant Professor of Civil Engineering, University of New Mexico

Economic Position

Economically, the position of the average engineer is even more unfavorable than his professional position. The men who have created the highest standard of living in the world now find themselves on the tattered economic fringe of this same standard. While starting salaries in engineering are comparatively high, it is only the occasional individual who, after many years work as an engineer, receives a salary comparable to that of an average doctor or dentist. This fact is clearly apparent to our students, and many of the more energetic and ambitious ones doubt the wisdom of continuing in engineering.

If there were some immutable natural law holding engineers in their present unfavorable economic position, there would be no argument. However, there is no such law. Engineers are usually in salaried positions, and the organizations that hire them find the money to pay tradesmen and other professions adequate salaries. Unfortunately, however, engineering salaries are usually determined by other engineers who, "well up the ladder," and, in a favorable professional and economic position, frequently feel no responsibility for the welfare of the men working under them. It is this lack of unity in our profession that has brought us to our present undesirable position.

The future success of engineering is dependent on a constant inflow of intelligent, well trained, ambitious young men. We do not want the average man, but the above-average man, the man who could be successful in almost any field he cared to enter. We must make our profession sufficiently strong and well enough respected to attract such men.

Five Year Course

There is much talk at present of making engineering a five-year course.

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No one will deny that the wealth of subject matter could be more adequately covered with an additional year and that better trained men would be produced. The idea appears sound but as long as our economic status remains the same it simply will not work. Many of our students already doubt that the rewards of engineering are sufficient compensation for the time and energy spent in necessary preparation. An additional year would make the training period of the engineer approximately that of the doctor while his economic status would still lag far behind.

Our young men are not greedy. They do not demand a chief engineer's salary for a draftsman's work. But they are economic realists and they know that the engineer's children will wear out shoes just as quickly as will the children of the bricklayer. Much as they are attracted by the nature of engineering work and its many nonmonetary compensations, they know that such compensations will not pay the rent or keep the kitchen cupboards full of groceries.

Last week, one of our students told a professor that he was considering dropping out of school and accepting a steady job paying three hundred dollars per month. He said that he could see little sense in spending another two years in school and then having to work in engineering for five or six years in order to get up to the three hundred dollar-per-month level. The professor, somewhat enviously, asked the student the nature of the job and was not surprised at all to learn that it was driving a city bus.

Present Remedial Action

Apparently, then, the engineer has made much more progress technically than he has professionaly or economically. The profession is indeed fortunate in having a number of well-established and highly respected technical societies whose work, in advancing engineering knowledge, is above question. A few of the major ones and their memberships are as follows:

American Society of Civil Engineers	21,000
American Society of Mechanical Engineers	20,000
American Institute of Electrical Engineers	24,000
American Society of Chemical Engineers	3,000
American Institute of Mining & Metallurgical Engineers	14,000

I would like to reiterate that the work of all these societies has been, and undoubtedly will continue to be, of inestimable benefit. Technical knowledge is increasing, not at a constant rate, but at an ever-increasing rate, and the technical societies certainly have a challenging job ahead of them.

These societies, despite their outstanding success in technical fields, have not succeeded in placing engineering on the professional plane it deserves. They have not, even with their Joint Council, succeeded in promoting a standard code of ethics for all engineers.

Only one of these societies, the American Society of Civil Engineers, has shown any real interest in the economic position of the engineer. This society has attempted to aid engineers by forming collective bargaining groups and proposing minimum wage scales. However laudable this effort may be, ASCE, with its 15,000 corporate members, is in the position of a very stubby tail trying to wag a great big dog when it tries, alone, to solve the economic ills of a profession of 250,000 members.

Two Solutions

There are two diametrically opposed solutions to the economic and professional problems confronting the engineer.

One: we can stop kidding ourselves and admit that, as presently practiced by the majority, engineering is not a profession and never will be. We will then be free to take direct economic action in our behalf, and if we should become adept at union politics, I have no doubt that in time the engineer would find himself even better paid than the tradesmen he supervises.

This solution has little appeal to the average engineer and will be used only in desperation. That the point of desperation has been reached by many is shown by the existence and growth of so-called engineers' unions affiliated with A.F. of L. and C.I.O.

The other solution, and one much more acceptable to most engineers, is to place engineering on a truly professional plane, and by so doing, secure the recognition that is necessary to our success. To do this, we must have a unified profession. We must stop thinking of ourselves as mechanical engineers, electrical engineers, and so on, and start thinking of ourselves primarily as *engineers*, period. When we do this, we will then be numerically strong enough to attain the professional and economic recognition we desire.

Steps to Unity

The following steps are necessary to secure real professional unity:

1. All engineers should work towards the adoption by our schools of one, and only one, basic engineering degree.

By this proposal I do not mean that all students should be required to pursue the same course but that, regardless of specialization, they would all receive the same bachelor's, of four-year, degree. A uniform degree is granted by other colleges where a student can study almost anything from art to zoology and still receive the same bachelor's degree. The student would still be free to major in the department of his choice and his transcript would contain sufficient proof of his specialization.

2. There is a definite need for a national student organization in our colleges that would unite all engineering students, regardless of specialization, in one body for discussion and solution of common professional and economic problems.

At the present time our student organizations reflect the chaotic condition that exists in our profession. Although we have excellent technical organizations sponsored by the various national societies, we have no unifying organization except on a purely local scale and for the sole purpose of staging an annual dance and electing an engineers' queen.

We had better provide and sponsor an adequate student organization quickly or we will find that the C.I.O. has done it for us.

3. There should be some provision for keeping the young engineer in the professional path during the interim between his graduation and his completion of registration as a professional engineer.

Most states require, in addition to the successful completion of a degree, at least four years of responsible practice before the young engineer-in-training for the graduated but nonregistered engineer. During this period the young engineer should be able to belong to a national professional organization and to feel that he is really wanted in the profession.

Support of Registration

4. The idea of registration as a basis for professional unity should receive the support of all engineers.

There is no better or quicker way to raise the standards of the profession

(*Continued on page* 17)

Two Hundred Years Of Engineering Education

Dean O. W. Eshbach of the Northwestern University Technological Institute establishes 1947 *as the two hundredth anniversary of formal engineering education. Herein he traces its development from the time of Louis XV of France to the present and then offers an outline of some current needs.*

By O. W. Eshbach

At this silver anniversary conference, it is significant to call attention to the fact that this year of 1947 may well be called the two hundredth anniversary of formal engineering education.

Arts, Crafts and Science

Engineering has always combined the arts and crafts with the application of science. These highly developed instincts were historically symbolized in the life of Leonardo da Vinci. While the builders of antiquity were both architects and engineers, art and science diverged into separate fields of endeavor in such a way that no time and place can be fixed for the birth of engineering in its modern sense.

In a royal ordinance of Charles V of France mention is made of engineers of bridges and highways, and during the reign of Louis the XIV the engineering profession had begun to develop a consciousness of its own.

Engineer Director

When his successor, Louis the XV, undertook to repair the economic structure of France, the director of the work was an engineer, Perronnet, who may properly be called the father of engineering education. Forced to organize a corps of draftsmen and establish uniformity in standards and practice, he ingeniously transformed this staff into a school of engineers. In his order of December 11, 1747, he directed:

> that these employees will be divided into three classes; the first composed of under-inspectors or under-engineers; the second of employees called *eleves;* and the third of young men of less education who are admitted to work in the office as auxiliaries.
> that the employees of these three classes not oherwise employed will report to the office of Perronnet daily, Sundays and holidays excepted, from eight to noon and from two to eight.
> that exceptional rewards will be given to the three most proficient employees of each class, who are to follow the courses of professors of mathematics and architecture indicated by Perronnet.
> that during the summer, the employees are to be distributed among the principal works in progress, to execute maps and plans.

Start of a System

While the school began to function in 1747, the name *Ecole des Ponts et Chaussees* was not officially bestowed until 1775. The quarter century which followed Perronnet's start marked the beginning of a system of engineering schools in France which held the leadership in professional engineering education for at least a full century.

Regarding our own country, we would not be stretching the truth to say that this is the century of modern engineering education; for a century ago the character of our first engineering school, Rensselaer Polytechnic Institute, and its name, were established as a result of the work of Perronnet and his successors in France. At that time, the number of engineering schools or schools of applied science in America could be counted on your fingers. What has happened since then is fairly well known.

I should like to call attention to a statement of objectives formulated before the twentieth century at the organization meeting of the Society for the Promotion of Engineering Education. In Volume I of the Journal of Engineering Education, which includes the Proceedings of Section E of the World Engineers' Congress held in Chicago in 1893, William H. Burr, Professor of Civil Engineering at Columbia College School of Mines, speaking on the subject "The Ideal Engineering Education," made three points worthy of repetition.

He said, "The first and fundamental requisite in the ideal education of young engineers is a broad, liberal education in philosophy and arts," with the main purpose to be "such cultivation of human qualities as will subsequently enable engineers to meet men as well as matter."

Second Fundamental

The second fundamental: "a thorough training in what may be termed the natural philosophy of engineering, which embraces all that body of mathematical and scientific knowledge constituting the pure theory of engineering operations."

The third, that "the time and attention given to those mechanical or routine portions of the course of study in engineering, which may be termed the purely practical parts, should be so applied as to thoroughly acquaint the student with methods, and only so much craft-skill in them is requisite as is necessary to that end."

For more than fifty years the idealism expressed by Professor Burr has been a subject of repeated discussion among engineering educators. Put in simple terms, these discussions are motivated by the conviction that the engineer's effectiveness in future society will be circumscribed by his understanding of the society in which he works and which he profoundly affects.

Broad Idealism

Professional education has always embraced broad idealism. The professions of law, medicine, and divinity are good examples. Their objectives to create an orderly society in which people may live healthy lives and have an opportunity for wholesome social intercourse and spiritual expression parallel the engineering objectives of lifting the burden of work, and, in cooperation with the economist, of spreading the benefits to all the people.

Three of these professional organizations have chosen a form of education which places the purely professional studies on a graduate level preceded by a minimum of three years of general educational preparation.

On the other hand, to draw the conclusion that the pre-profesional education is a liberal one rather than specialized in the sense that it is utilitarian or directed specificaly to-

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ward an essential background for further study, would be erroneous. Premedical education certainly is not a liberal training. Preparation for the ministry requires by its very nature a liberal foundation in the humanities and social studies. In recent years many in the legal profession have felt that an emphasis toward political science, together with a minimum understanding of our physical world and its historical evolution, should characterize at least a part of the preparation of the professional study of law. It is the belief of engineering educators, supported by experience, that the prerequisite of a liberal education for professional study of engineering as proposed by Professor Burr is a noble ideal but unworkable in practice.

Technical Ability

In the recent quarter century celebrated by your silver anniversary we have experienced the effects of two disastrous war. During the conflict and afterward, there has been no question among the nations as to the power and quality of America's technical ability. The work of our engineers is admired universally. Foreign countries are choosing to send their most promising students to American technical institutions in order that they may benefit from both the knowledge and the educational methods which have brought us this enviable position.

In a comparative sense, the kind of individuals, particularly the American youth, who represented us in the armed forces, have been equally admired, a situation which creates the hope that some of the good elements from the social and political life of our country may be transplanted to strife-ridden areas of the world. We can say this without the feeling of self-sufficiency or conceit. To be fair, however, we must look at the political, economic, and social problems which suffer in comparison.

If we who are interested in young people and their education believe that these results have been influenced by our systems and methods of education, we have an obligation to consider whether the non-technical phases of the training of our youth are adequate to the establishment of national and international peaceful relations.

Obligation of Schools

This introductory observation is made for a purpose, for in analyzing the obligations of an engineering school to young engineers it is quite evident that unless a foundation is laid in college, efforts after graduation are unnatural and largely fruitles. The problem is not so much the excellence of technical instruction, important as that may be, but the cultivation of an attitude of mind that makes intellectual pursuit, civic responsibility, and social intercouse natural expectancies.

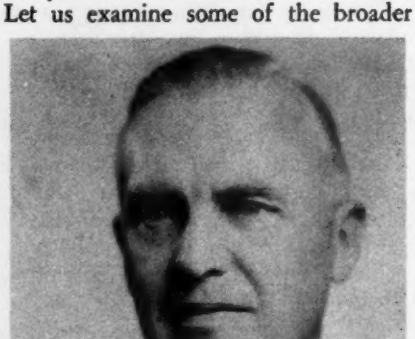
Even this is inadequate when we are discussing professional standing. A professional man is judged to be a person of character with special ability applicable to activities entered into for the public good. The nobility of character creates the aristocracy of professions.

Before getting too involved, let me take a negative, yet objective, view of what can happen in an engineering school.

Education Nadir

Suppose we begin by admitting anyone who graduates from high school and justify the policy on the basis of democratic procedure. The compromises which result crowd the curriculum, make it technicaly burdensome, and lower the level of thinking. In four or five years those who survive look for a job, which frequently is the main objective, find the nature of their work different from what they had expected, are dissatisfied, and join a labor union to get an increase in pay. This is a sordid picture of the nadir of profesional education.

Engineering educators have a responsibility to their students and the society they will later serve. There can be no question about this. The only time to discharge this responsibility is when we have them in school. Let us examine some of the broader elements, together with the difficulties involved in their fulfilment.



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1. An effective system of selection or admission fair to the profession, the students, the parents, and American industry.

It must be recognized that our present engineering schools are almost the only agencies for preparing youth for technological pursuits. Within the provisions of the colleges collectively, admission requirements must care for the present interests and future needs of young men. This does not mean that all schools should have the same requisites. No measures should be taken to limit the freedom of schools who wish to establish distinctive objectives or carry out limited objectives in their programs. Put simply, we must realize that the engineering profession is something within the engineering fraternity which embraces technology. There is no engineering institution which has made strictly professional practice its sole objective and carried it out.

2. A provision that makes possible a progressive choice of career aims.

Engineering freshmen are largely boys attracted by the appeal of applied science and favorable placement of graduates. Others have submitted to parental persuasion or have chosen engineering because of the charm or popular appeal it holds and also because of the fact that the value of a college degree has been overemphasized as what is considered socially acceptable. There is only a meager appreciation of the meaning of the professional segregations inherent in our traditional practices. Secondary schools have long been conscious of this, and the engineering profesison has always responded to requests for aid from them. A provision that makes change possible without too serious an academic handicap, including transfer out and into engineering, is essential to a good educational program. At the beginning the motivation of practical interest is strong. Intellectual interest needs to be awakened and nurtured if it is to characterize professionalism, as it must, and be of life duration. For most students the sun rises about midway in their college program.

3. A sound undergraduate program with recognition of the obligation of inculcating professional ideals and standards.

It would be unfair to say that our present undergraduate programs are

like Topsy—they just grew up. Much thought has been given them. No professional group has tried more intelligently to do a good job in a sensible way. On the other hand, we must admit that the curricula are compromises, and because they are the fault-finders are continuously at work putting educators and the profession on the defensive. We know what we are doing and frequently wish others knew as well, but we should not be satisfied with the self-allocation of a judicial function. We may not be the sole judge of our actions. Parents, industry, and other educators want different programs. Homogenity is not a characteristic of their wishes. If it were, it would receive the immediate consideration of the profession. If, however, we discard selfish interests, economic restrictions most varied in type, and the product of purely idealistic imaginations, there is one sincere wish. It is the desire for a broader and more fundamental undergraduate program.

Pertinent Questions

Let us try to answer these questions:

a. What is a good undergraduate technical education with reference to the probable needs of our society in the next generation?

b. In comparison, what are we doing today?

c. Is there any practical recommendation that would approach the ideal and enhance the opportunity for professional development?

As now organized there are four major divisions of undergraduate engineering curricula:

1. Mathematics and science.
2. Non-technical and social-humanistic studies.
3. Basic enginering.
4. Professional specialization.

In a four-year program a rough allocation of time is a full year of study for each division. If, however, each division's content is examined with the objective of determining what minimum knowledge should be acquired to produce a broadly educated engineer, the first three divisions, which form the common core of all curricula, would each require two years, or a total of six years without any professional specialization.

Today's System

Actually, what is being done today is a selection of half the basic instruction desirable for professional competence and the addition of a year of specialization. If the specialized instruction could be confined entirely to the fourth year of study, profesional guidance would be greatly simplified. As we know, this is impossible, for two years is the shortest time for most sequences of specialized study in any of the professional divisions of engineering.

In considering an alternative the choice must better meet the needs of the profession and the society it serves in the next generation. Would it be more useful to young engineers and the industries they serve if almost no specialization beyond that of basic engineering instruction were attempted in the undergraduate program? A five-year program as now advocated by some could then lead to a degree of B.S. in engineering in four years and an M.S. in engineering in the fifth or sixth year.

4. A real graduate program that leaves no doubt of the professional character of engineering.

Are we at the point where all study in specialized branches of enginerring should be put on a graduate basis?

A student's need for advanced education is not always evident to him in his early undergraduate years. An exploratory experience in industry, however, provided, will enable him to discover and define his interests. A natural process of guidance operating through individual experience is a better method of selection for advanced study than the imposition of uniformly lengthened programs of undergraduate study. Preparation for advanced professional levels of engineering is definitely a responsibility of colleges. In recognizing this fact, the SPEE report of 1939 states: "Provision for post-graduate education is necessary if adequate time is to be allowed in the undergraduate period for thorough grounding in the basic sciences, for laying the foundations of a social philosophy, for developing powers of effective expression, and for cultivating reflective and critical habits of thought.

Adjustments Needed

"To attain these objectives will require the transfer of some of the more advanced subject matter to the post-baccalaureate period where it may be pursued with rigor consistent with adequate preparations for engineering specialization."

The responsibility of engineering schools is confused by two conflicting facts. On the one hand, technical knowledge has multiplied beyond the powers of the strongest intellect to keep the pace. On the other hand, a broad education is in danger of attempting too wide a spread. Professional men whose lives were not distracted have brought things to pass and impressed the ages in which they lived. We must choose, and one practical guide to choice is utility. What choices will best serve our future society?

Three Educations

Perhaps the choice is not so serious, for every engineer has three educations: one which he consciously receives from others, one which he gives himself, and one which is acquired from the atmosphere around him. The best education and preparation for professional work does not come from the process of reception or absorption.

Good education is not the art of allowing others to do as much for us as we have the capacity of receiving, but is rather the measure of our own self-preparation.

The planning of a program of social-humanistic studies should not be looked upon as the implementation of methods of directing students to meet specific situations, but rather the creation of atitudes or ways of thinking that will enable them unconsciously to meet these situations in a practical way. The problem is a very practical one, as has been shown, and is serious because it affects the whole character of engineering education. No matter how the result is accomplished, it is important that attention be given to the kind of program which would at least stimulate thinking in the right way and cultivate habits of reading and study carrying over into professional life.

General Content

It would be presumtuous to outline in detail what a program of social-humanistic studies should embrace. Specification of the general content is not so difficult. For example, if a minimum time of three hours a week for a three-year period were set aside for this purpose, the following subjects might well be included:

First, a study of the forces which have shaped our American civilization and which would include the transplanting of European civilization in American colonies. Also, the prin-

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ciples and interests in conflict during the revolutionary period and the principles and structure of our republican government. The passage from an agricultural to an industrial system might well include the slavery issue, the development of the west, problems of immigration, urban development, capitalism and its control, and the social-economic problems arising during World War I and World War II.

Economic Forces

Second, the study of economic forces. This might begin with the economic geography of North America, the reasons for the location of our industries and transportation system, the manifestation of our destiny because of our world resources and world trade, cultural inter-reactions, and the necessity for world-wide understanding through closer cooperation and organization.

Third, an understanding of the philosophy of physical and social sciences, particularly the latter, because much of engineering gives a direct insight into the physical sciences. The psychology of human behavior is related to the practical problems of labor organizations and social and community life.

Fourth, what some would term a humanities sequence aimed at the interpretation of man in past and present society through the study of world and modern literature. In such study, the correlation of history with individual thinking and idealism might well be emphasized, and the customary learning of facts involving memory, de-emphasized.

If time permitted, the kind of thinking a program of this nature would cultivate might well be focussed upon the development of attitudes and techniques of studying immediate social questions and analyzing their many ramifications.

In this proposal I have omitted the more practical, non-technical studies involving courses in busines and commerce. On the other hand, I think that all of us should be philosophic enough to realize that practical necessities will always take precedence over the intellectual, and we must appreciate that every person desires the kind of preparation for life which will maintain him in honest independence.

Continuous Anticipation

In conclusion, the profession of engineering education is quite similar to the sports of golf and fishing, in this respect. It is an occupation of continuous anticipation and perpetual disappointment. Success in it requires a professional attitude and an acceptance of responsibility which the nature of our society imposes upon it. It is somewhat akin to the responsibilities of parents, who try to do the most for their children while they have them at home. The behavior of the child after leaving home may reflect on his parents, but their control is largely gone. It is here that we, as engineering educators, pass the baton at graduation to you in professional practice.

Future Engineering Trends

(*Continued from page* 5)

Another field is along the lines of centrifuge apparatus requiring special high speed machinery.

In power machinery the trend to higher speeds offers complications in shafting problems, critical speeds and the dynamics of elastic foundations.

In hydraulic engineering, the expansion of waterpower throughout the country and irrigation projects offers further opportunities. This field may also provide a means of improving the food supply of the world at large through irrigation. Power transmission through hydraulic sytsems is of immense interest in its application to machinery, such as in transmission drives and presses. The use of high pressures and pumping apparatus may offer further opportunities of application.

Research Engineering

The scientific side of engineering is essentially physics, which requires basic scientific qualifications.

While engineering science is more concerned with the applications of physics and chemistry, there can be no clear demarkation between them since the principles of physics are likewise the principles of the scientific phase of engineering.

However, the approach to many physical problems by the engineering scientists and physicists are somewhat different. The outstanding difference between the physicist and the engineer is the considerably greater mathematical background of the physicist.

Moreover, the physicist reduces the problem to a mathematical language which has now become so closely associated with our understanding of physics, that no other type of approach is possible. A pioneer American physicist, Arthur Gordon Webster, stated that once the phenomena can be expressed through its differential equation, the phenomena is scientifically understood. As against this trend the engineer has been compelled to give up his models and geometrical constructions in the very nature of the complication of modern physical phenomena.

More Realistic Way

On the other hand the engineer approaches his technical problems in a more realistic and possibly useful way. Thus, in the more elemental phase of mechanics, his interpretation is clearer, as in mechanics of elementary interactions of structures and machine parts, and in kinetics. Since the physicist has a broad understanding of the overall mathematical approach, he has a better understanding of generalized dynamical methods which lead into broader applications. In electrical problems the engineer has a better understanding of the generation and transmission of power through circuits and electrical machinery, but completely lacks the physicist's background of the mathematical approach to the subject.

On the subject of thermodynamics, the engineer has perhaps a better groundwork for applications of thermodynamics to engines and turbines and power systems. However, he is limited in the broader point of view of thermodynamics, and particularly in the extension to statistical mechanics to new regions in science.

It seems that these two methods of approach can be brought together in our pursuit of research problems.

Research Topics

The problems of engineering science research are of course closely allied, and in some cases approach pure physical research. Some basic topics for research are the scientific and physical approach to the present art of metallurgy. While this is being carried out directly by some physical metallurgists, it offers a new field for engineers. The metallurgical phase includes, of course, many physical principles, but is essentially an empirical science, almost to the extent of an art. It points out happenings in properties of materials under various physical conditions, but does not reason

fundamentally as to their causes, from the scientific aspect.

The science of metals can be approached from two angles, one through the macroscopic attack, using the methods of classical and applied mechanics, including elasticity and plasticity, to considerable advantage. For instance, in the interpretation of the physical properties of metals, the biaxial and triaxial stress conditions give new points of view on the interpretation of test data. On the other hand the space-lattice structure of metals offers an approach through quantum mechanics.

The science of metals has many aspects for physical research, including the effect of temperature in atomic structures of various alloys and the reactions of applied forces and corresponding stresses, within the materials unuder various constraints.

The significance of macroscopic and microscopic stress concentrations, together with a statistical procedure on the theory of cracks within a material, may give us further clues as to the real nature of fatigue.

A study of microwaves with high-frequency mechanical vibrations and their propagation across various types of discontinuities may give us further clues as to the nature of impact and the importance of friction damping in materials.

The opportunities in this field are very broad and of great importance to the engineer.

Turbulence in Fluid Flow

Another field of great importance is the science of turbulence in fluid flow. It is basic in many engineering problems, as in turbines and airplanes and hydraulic machinery.

While electrical machinery and the transmission of electrical power to mechanical work has been carried out, new problems arise in reducing the number of laminations in rotating cores, in higher flux densities in materials, together with lower eddy currents. The calculation of self and mutual inductance in complex systems offers further studies.

The field of electrical machinery, along with servo-mechanism transmission problems, also points the way to the general subject of electro-mechanical traducers. Electro-mechanical systems cover generalization as in a better understanding of Piezo electrical systems for transmitting electrical oscillations to mechanical vibrations and corresponding high frequency waves through various types of mediums.

Along the lines of heat transmission are many problems in the coordinating of temperature conditions in heat flow, with corresponding stresses in various types of structures. This science is perhaps more important than the immediate improving of engineering materials for resisting high tempearture. Obviously the two go hand in hand, but probably most failures in the gas turbine field can be credited to the lack of understanding of the former.

New border line subjects of a fundamental nature such as electro mechanics, gas dynamics and combustion, fluid and soil mechanics, engineering accoustics, the engineering of metallurgy, including plasticity and quantum mechanics, geophysics, and the engineering phase of chemistry in process development, all offer opportunities in the field of engineering research.

Finally, the science of physical measurements in experimental work, requires a broad knowledge and training on instrumentation and electronics, together with a study of the limitation and approximations of experimental procedures and the technical and statistical evaluation and interpretation of experimental results.

Research is essentially a *component study*, together with the interaction of these components.

A development engineer and a design engineer uses these components for building up new machines and structures for useful purposes.

The Professional Engineer

In closing this dissertation on the education and opportunities of the engineer, I wish to coordinate it with the proper aspects of the professional engineer. The professional engineer must first be concerned with advancing his true professional status through real contributions in engineering science and constructions, and the advance of the scientific and economic phase of engineering. Along these lines he is, of course, at all times concerned with not only being a student for further advancement, but also that of inspiring this interest with his colleagues.

If he does these various matters well, he has accomplished a large part of the requirements of a real professional engineer.

It is highly important that the engineer realize that engineering, from its broadest aspect, is still a component of a much larger group of things which constitute our present civilization. We have, so to speak, couplings between these various outside activities. The points of view of law are connected with engineering quite closely, as in the patent field, and in specifications and contracts.

The engineering phase has a definite relation in the marketing of given products. Even in quite different subjects, such as music and in the arts, we find the applications of accoustics and television connecting such arts with science. These in-between fields offer additional opportunities for the engineer.

The social aspect of the engineer cannot be overlooked. While the status of the engineer is best protected by doing jobs well, on the other hand the interchange of ideas with his fellow engineers is of considerable importance. It is equally important that the engineer contributes in bringing out and developing the younger engineer, as well as his own colleagues, to their greatest efficiency and capacity. It seems along these lines the professional engineer has a unique opportunity in discussing these matters at various gatherings.

The code of ethics among engineers is fairly well established, but the code of ethics with respect to outside contingencies is in some cases unsatisfactory. This is a field that also may require cooperative exchange of ideas and mutual help through the group of Professional Engineers.

THIS MONTH'S COVER—

This month's cover photograph is of the Statler Hotel in Washington, D. C., scene of the State Secretaries Conference to be held July 11 and the NSPE Board of Directors meeting to be held July 12.

The State Secretaries Conference has been approved by the Board of Directors as a result of the success of last year's meeting. The Board meeting is the group's regular summer session.

Among the important topics which will be discussed at these meetings are: state publications, membership activities, chapter activities, engineers-in-training, legislative procedures, membership certificates, transfers of membership, dues statements, review of existing forms, and methods of promoting attendance at the annual meeting.

A banquet is planned for the evening of July 11. It is expected that members of Congress who are engineers will be present.

Fire Prevention Activity

(*Continued from page 2*)

erty from fire could best be promoted as a matter of state responsibility and authority. The Governor was urged to appoint a commission including registered professional engineers and other qualified personnal to investigate and examine existing building and fire prevention codes and practices in the various local communities; inspect fire hazards; and submit its findings and recommendations to the Chief Executive.

Indiana Backs Strong Bill

One of the most important acts passed by the Indiana General Assembly in its recent session dealt with the problem of fire prevention and received the support of leading professional engineers of the state. The law now provides that it shall be the duty of the state fire marshal to make, promulgate and enforce rules and regulations specifying the type, number and location of fire escapes, ways of egress or means of escape from fire, necessary for every building used in whole or in part as a public building, public or private institution, sanitarium, hospital, nursing home, surgical institute, asylum, school house, gymnasium, dormitory, church, theater, public hall, place of assemblage, place of public resort, store, restaurant, factory, workshop, mercantile or other establishment, hotel, apartment house, boarding house, lodging house, club house or tenement house.

The state fire marshal is also given other broad powers sufficient to warrant the comment of a member of ISPE., "we feel that Indiana has taken a step which should be a means of preventing any disaster, similar to those which occurred in hotels last year, in Indiana."

New York Joint Committee

As a direct result of a letter from the President of the New York Society a group has been formed and has launched an active program of fire-prevention activity. The body is known as the Joint Committee on Codes of the Metropolitan Chapters and includes members from the Bronx, Kings, New York, Queens and Richmond organizations of the New York Society. In addition to attending in force all meetings of the New York City Council at which changes in the multiple dwelling laws are discussed, the group also closely follows municipal and state legislation pertaining to the same subject. The Joint Committee is also working closely with the fire and health departments in checking for safety and health violations.

Other NYSSPE chapters have appointed full committees to study the problem in their respective communities or have named members to work with responsible municipal authorities in making the necessary studies and surveys. In his letter to all State Chapters, the New York Society President stated, "the cooperation of professional engineers in preventing another catastrophe such as the Winecoff Hotel fire not only will be worth many times the effort involved but also will give them an excellent opportunity to participate in local civic activities."

The Chairman of the Joint Committee reports that his group considers the following as important items: (1) All doors opening on stair halls and corridors should be made self-closing and if there are any transoms over them, the transom should be fastened shut and covered on the hall side with fireproof material; (2) all stairways should be closed off from the balance of each floor by fireproof self-closing doors; (3) all stairways should have louvered skylights with thin glass over them, or some louvered vents provided; (4) a wet pipe automatic sprinkler system should be provided to cover the stairhalls and corridors so that a sprinkler protected means of egress will be provided; and (5) an interior electric fire alarm system should be installed along with a watchman's recording system.

The Committee found one important delinquency which must be considered on a national basis. It is a complete lack of uniformity in the designation of exits and location of fire extinguishing equipment. This is found to be especially true as to interstate conditions. The Committee reports that *exits* are marked with numerous types of signs and also have different colors as well as different colored lights over them, leading to confusion at a time of panic. It was suggested that a uniform system be set up for designating Exits and this be offered to the various Hotel Associations.

New York State was also quick to adopt legislation to protect hotel occupants which received the full support of the Joint Committee. The law is designed to enforce safety measures which will prevent the spread of fire from floor to floor and restrict its horizontal spread on a single floor. Safety requirements include adequate exits, wet pipe sprinklers in places of particular hazard, standpipe and fire alarm systems, watchmen, the inclosure of all shafts, automatic skylights and self-closing doors. Door transoms will be eliminated under its provisions.

In signing the bill Governor Dewey stated that he was aware some of its provisions would constitute a hardship on many hotels. "Over all, the bill is of such major importance to the safety of the public that its approval despite any minor imperfections is essential," he stated.

Washington State Bill

The Washington State Society will consider the overall problem of fire prevention at its next statewide meeting with a view to setting up a state wide committee to work with the Association of Washington Cities. This group may prepare a bill for the 1949 Legislature to consider in setting up a uniform code for the State.

The Wisconsin Code was named as one to which the Washington Code should correspond. Advices from Wisconsin are to the effect that the State Code, if properly enforced, provides good regulation and contains provisions presently being considered by other states. Nevertheless the Wisconsin Society has transmitted to the State Industrial Commission an offer to assist the Commission in revision of the State Building Code should change appear necessary to strengthen provisions relating to fire prevention.

Day by Day Job

A correspondent reporting on the fire prevention situation in Baltimore, largest of Maryland's cities, says, "this matter of fire prevention is a day by day job of teaching and enforcement." A new code was adopted in 1946, naming the Fire Department as responsible for upkeep and general maintenance of Code standards. Violations that develop after the inspector releases the building as complete are caught by the Fire Department inspectors who report them to the Bureau of Buildings. The Buildings Engineer in turn takes whatever action is manadtory. The present procedure is that old buildings, when either construction or occupancy is changed, be so altered as to conform to the type required by the Code. In this way old hazards are eliminated by reconstruction or by denial of use. "All any community needs to do," states the Baltimore correspondent, "is

to get someone to make a daily job of checking hazardous tendencies and anticipating real disaster before it occurs. As a matter of fact it is not a technical, but purely a human relations problem."

The Maryland Society reports that the subject has been under discussion in recent meetings, and while the Baltimore Code appears adequate continuing study is being given to both Baltimore City and the outlying districts.

OSPE Offers Cooperation

The Board of Trustees of the Ohio Society has voted unanimously in favor of a motion calling for immediate steps to review, revise, and strictly enforce fire and safety regulations in public buildings in Ohio "to the end that we shall never have to bear the regrets and tragic consequences of the series of holocausts that occurred during 1946." The State Fire Marshal has been advised that Ohio's 3200 members have been alerted to assist in bringing this vital matter to the attention of the proper officials in their various communities. Officers of the twenty-seven local chapters have been requested to appoint committees to carry out these local and regional assignments. The Society's letter recognized the fact that public officials in the field of fire prevention have a thankless and unappreciated job but assured the Fire Marshal that "As engineers and public spirited citizens we wish to assist in every way possible in this humanitarian and sound economic function."

The Chief Inspector of one of Ohio's largest cities has told the Society that he is very anxious to obtain the cooperation and support of engineers in the city's programs. The Ohio Society is supporting the establishment of a Building Code Commission with the request that one of the four members be a registered professional engineer qualified in the structural or architectural engineering field.

Other States Active

In addition to the State Societies named herein other State Societies are maintaining active programs in the fire prevention field. Progress has been slower or faster in each State depending upon local conditions and other factors. Reports have not been received from all States, but what information is in hand indicates that State Societies and Local Chapters are doing everything within their power to attack the problem with vigor and enthusiasm.

Federal Legislation Proposed

Federal legislation on the subject is proposed by two members of the House of Representatives—Albert S. Camp, (D., G.) and Charles B. Hoeven, (R., Ia.)—who would establish Federal standards utilizing the present facilities of the National Bureau of Standards and other means for research and study. The standards would apply to hotels, apartments, schools, and other buildings where large numbers of public congregate or are housed, and to the materials used in such buildings. Standards would also be established for fire detection and for life-saving equipment and facilities for such buildings. The Secretary of Commerce would make suggestions and proposals for model state laws and municipal ordinances and would encourage their adoption by State and municipal authorities.

The federal standards and model laws would not be compulsory, but one of the bills would authorize the Secretary of Commerce, upon a showing of compliance with the standards, to issue a certificate to that effect which could be used for display and advertising.

Many fire prevention experts feel that these proposals are not realistic. There are some 30,000 structures classified as hotels in the United States, and the staff necessary to make the inspections prior to issuance of a certificate of occupancy, would have to be extremely large. There is general agreement that the problem must be handled on a State and municipal level.

President's Conference

An important step in the battle against fire-causes was taken within the past few weeks when fifteen hundred public officials and representatives of important professional, business, civic, service, women's and farm organizations met in Washington, D. C., to attend the national conference on fire prevention called by President Truman to develop a practical program for a country-wide drive against the fire menace. NSPE was one of the participating organizations in the conference and pledged its whole-hearted support to the cause.

President Truman opened the conference with a plea to "use all our experience, knowledge, and organizational facilities to solve our fire problems." The Chief Executive pointed out that, "we have a complexity of building laws and codes in some communities, and too few in others. In many communities, these laws are outdated, and the responsibility for safety from fire is not clearly defined."

The conference was under the chairmanship of Maj. Gen. Philip Fleming, Federal Works Administrator and an engineer, who told the delegates, "we have learned a great deal in the last 25 years about fire prevention and all over the country we face the problem of bringing thousands of older buildings—hotels, hospitals, theaters, apartment and rooming houses—up to the standards of safety we now know to be essential if we are not to have more and more Winecoff disasters as time goes on."

After 3 days of deliberation the conference urged acceptance on the part of public officials of greater responsibility for fire safety, and wider public support for all measures dealing with fire prevention. Governors of the 48 States will consider proposals that they appoint state-wide safety committees and that a state-wide fire prevention conference be summoned in each State to set up practical fire prevention programs tailored to the needs of each area. The Action Program, adopted by the conference made the following findings and recommendations:

Law Enforcement: In the field of law enforcement, the conference Action Program stated that each State and municipality should initiate immediately a study to determine whether present fire-prevention regulations are so antiquated or obsolete as to create perils to human life. Other recommendations were that each State and municipality set up an advisory board to keep abreast of new developments in building construction, that cities be given authority to adopt modern building codes, and that strengthening of

(*Continued on next page*)

Maj. Gen. Philip Fleming

(*Continued from preceding page*)

state-wide fire prevention laws and building codes be given further study.

Building Construction: In building construction, the Action Program recommended that construction materials be selected for their fire resistant properties, that adequate barriers be provided to prevent spread of fire, that two exits be provided in every building where hazard to life exists and that proper extinguishing equipment be installed.

It also recommended that the various groups sponsoring building codes meet in continuous conference to reach agreement.

Fire-fighting Services: Turning its attention to the nation's fire departments, the Action Program recommended that these departments be regarded as fire-prevention agencies as well as fire-fighting agencies, that greater training facilities be provided for firemen, and that obstacles to fire department work as a career be removed.

The conference urged all State legislatures to enact laws that will empower township and county governing bodies to establish special fire-protection districts to provide public fire-fighting service in rural areas.

Fire Prevention Education: Better education in fire safety and fire prevention was urged. "We owe the 30,000,000 young people in our schools today the best instruction possible in fire safety," the Action Program stated. "Basic fire-prevention instruction should be intensified and expanded at all levels of education and in all types of schools—public, private and parochial."

Each State department of education is urged to take the lead in its own jurisdiction in developing fire-safe school properties. That instruction in fire prevention be varied to meet local conditions, that teachers be encouraged to participate in community fire-prevention activities, and that school fire prevention activities be closely related to community problems are recommended.

At the college level, the conference urged that fire prevention be integrated with such courses as chemistry, physics, business administration, insurance, economics and transportation. Courses in engineering and architecture should include fundamentals of fire protection, the Action Program said.

Research: Continuous research in the field of scientific development and human behavior with respect to fire was recommended. The conference urged adoption of an educational program which will try to show the public how to avoid panic in fire situations. It recommended scientific selection and training methods for firemen. It also recommended better mental examinations and treatment for "psychotic" persons suspected of starting fires.

Continued cooperation of industry in exchanging information on research and experience gained in the use of new chemicals, processes and operations relating to fire hazards was also urged.

It Can Happen In Your Town

The appeal put forth by President Lawrie of NSPE, following the Winecoff Hotel fire, headed as above, is still the policy of NSPE and a re-reading of it is urged upon each and every person interested in fire prevention. The "call to arms" in the fight against fire was as follows:

Engineers of America!

The number of tragic fires throughout the nation as emphasized by the appalling Winecoff Hotel holocaust at the time of the recent NSPE Annual Meeting in Atlanta directs attention to a civic responsibility demanding immediate action.

Can it happen in your town? It most certainly can and given time it most certainly will—unless and until there is impartial, strict enforcement of an adequate, modern building code.

Engineers of America—the time to act is now—today—not tomorrow, for tomorrow may be too late.

First—There should be an inspection by the proper public officials of all places of general assembly and occupancy such as hotels and apartments, theatres, movies and night clubs—schools—churches—commercial and industrial buildings.

Second—The inspection should be followed by a report calling upon the respective owners of all such places to proceed immediately to eliminate any and all hazardous conditions—with a follow up to see that the job is done.

Third—There should be an examination of existing building codes to ascertain and put into effect amendments as may be necessary to insure a building plan, as well as the use of construction methods and materials which will result in the erection of safe fire-resisting structures.

Fourth—We engineers should support and when called upon assist public officials in their efforts to strengthen and enforce the law.

And finally, we engineers should keep everlastingly at it until the job is done, bearing in mind that an informed and aroused public always will overcome any apathy of public officials.

Engineers of America—do not let it happen in your town!

Registration Law in Kansas Made Mandatory

Progress toward the goal of adequate engineering registration laws in every state has been reported from Kansas, where the State Legislature has enacted and the Governor signed a bill making engineering registration mandatory.

The new statute will become effective when it is formally promulgated—about July 1, 1947.

Important provisions of the new law, which is patterned after the model law, include:

1. Only qualified licensed professional engineers may use the title or practice professional engineering in Kansas.

2. A detailed definition of the term, "Professional Engineer" is included. It is patterned after the Illinois law.

3. Architects, *not* architectural engineers, are exempted.

4. A state board of engineering examiners will be appointed to administer the law.

5. Annually, a roster of all licensed engineers will be printed and distributed.

6. Technical and other qualifications of applicants for licensure are defined.

7. Licenses must be renewed annually, with the Board having the right to establish the fee (maximum $10.00 per year).

8. The usual "grandfather clause" permits engineers now practicing to qualify for license without examination.

9. Reciprocity with other states is established.

10. A procedure for revoking or denying licenses for fraud, incompetence and other reasons is established.

11. Those who illegally practice or offer to practice engineering are subject to a fine of not less than $100.00 or more than $1,000.00 or imprisonment for six months or both.

12. Excludes draftsmen, stationary engineers, safety engineers, architects, design and erection of structures for personal use, including the design of products for resale.

The Act also repeals the optional law under which Kansas Engineers have been permitted to register.

Texas Ladies Form Club

Last March 24 down in Nueces, Texas, a group of TSPE members' wives were at a tea party when one of them suggested a ladies counterpart of the Nueces Chapter of TSPE.

That sounded like a good idea to the ladies so today there is a *Nueces Auxiliary to the Texas Society of Professional Engineers.*

For wives of members of NSPE who might be interested, here is how it's done in Texas:

1. Mrs. Harry E. Graham and Mrs. James C. Harris, wives of the president and secretary of the Nueces Chapter respectively, gave the tea. Engineers' wives who were present expressed interest in the proposed organization.

2. A steering Committee met at the home of Mrs. W. W. McClendon. The ladies present were particularly interested in the project, many of them being wives of officers or committee members of the Nueces Chapter. This Committee named (1) a chairman, (2) a temporary secretary, (3) a Nominating Committee, (4) a Constitution and By-Laws Committee, (5) a Telephone Committee, and (6) a "Time and Place" Committee.

3. The first organization meeting was held April 14. Thirty members registered. The group, operating under the previously appointed chairman, adopted a resolution that the club be formed "for the promotion of friendship and understanding among the wives of Professional Engineers."

4. The next regular meeting was held May 12 at the Nueces Hotel and permanent officers (an election having been held by mail) kere installed. The new president of the group, Mrs. Conrad Blutcher, made a plea for united effort to strengthen and enlarge the auxiliary and for its members to assist the men's society wherever possible.

The Officers of the new auxiliary are: Mrs. Conrad Blutcher, president; Mrs. James C. Harris, vice-president; Mrs. M. H. Allen, Jr., secretary; Mrs. L. P. Scholl, treasurer; and Mrs. Nat W. Hardy, Mrs. T. O. Foster, and Mrs. Joe E. Woods, directors. (See photograph this page.)

Officers of TSPE's Nueces Ladies Auxiliary

Seated, left to right, Mrs. James C. Harris, vice president, Mrs. Conrad Blutcher, president, Mrs. M. H. Allen, Jr., Secretary; standing, Mrs. L. P. Scholl, treasurer, Mrs. T. O. Foster, Jr. and Mrs. Joe E. Woods, directors.

Unity Is Possible

(*Continued from page* 8)

than through registration. The successful completion of college work is not in itself a sufficient index of competency. Practical knowledge is necessary and most state registration examinations are designed to test the applicants' practical as well as academic knowledge. Engineers, working through a united organization, could determine the nature of such examinations in their respective states and thereby progressively raise the standards of the profession.

5. There must be an organization of all engineers, regardless of specialty, to implement these and other worthwhile ideas.

Such an organization would act as a unifying agent and could do immeasurably more to better the professional and economic position of the engineer than any of the technical societies working separately. There should be no conflict of interests whatever between the present highly respected technical societies and such a unifying society. Each should recommend to its members that they belong to and support the other. Such an organization is our only hope for moulding our present individualistic, skilled vocations into a strong, unified, recognized, and respected profession.

The steps I have outlined will require time to accomplish. However, we are fortunate in that the fifth and most important single step, the unified professional society, is already organized and functioning. The National Society of Professional Engineers can and will be the instrument for forging engineering into a real unified profession. The choice is squarely up to us. Either we continue as we have in the past and allow engineering to degenerate into a loose collection of highly skilled trades or we organize profesionally and all work together toward our common goals.

An Adventure

In Logan, Utah, NSPE has a remarkable member.

He is Orson W. Israelsen, a consulting engineer. The remarkable thing is: Dr. Israelsen is totally deaf.

One summer morning in 1928 he was awakened by a severe thumping and roaring in his head. Within a few hours he was completely deaf. This was the dramatic beginning of a new type of life for Dr. Israelsen—a life which he calls an adventure.

It did not stop his engineering, however. Today he is a consulting engineer on agricultural and civil engineering problems. He is recognized as an authority in the field of irrigation, having written since his deafness "Irrigation Principles and Practices", a standard book on the subject which has gained recognition in many parts of the world.

After becoming deaf Dr. Israelsen continued most of his normal activities, including that of conducting his classes at the Utah State Agricultural College. He experienced a difficult period of adaptation, but was so successful in meeting his problem that his normal routine was continued. He remained a member of some very important committees in the college and has done extensive work for various engineering societies.

In speaking of handicaps which men and women have, Dr. Israelsen says: "We can neither deny nor ignore the fact that it is not the handicap but the reaction toward it that counts."

MEMBER STATE SOCIETIES N.S.P.E. — *Officers and Directors*

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ILLINOIS	(Acting Pres.) DUNCAN M. CAMPBELL c/o Dept. of Highways 160 North LaSalle St. Chicago, Illinois	H. E. BABBITT 204 Engineering Hall Urbana, Ill.		W. A. OLIVER 201 Engineering Hall Urbana, Ill.
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Kindly report any errors or omissions to the Editor

National and State Society News

News From the Washington Office

Your Executive Director has just returned from a trip to the West Coast to investigate the attitude of engineers in that locality regarding many of the problems with which the National Society of Professional Engineers is concerned.

Paul H. Robbins

En route an invitation of the Chicago Chapter of the Illinois Society of Professional Engineers to speak at a dinner meeting May 12 was accepted. The engineers attending this meeting showed considerable interest both in the National Society and its program and asked many pertinent questions regarding labor legisaltion and other matters.

Idaho Visit

The next stop provided an opportunity to address the Southwest section of the Idaho Society of Professional Engineers. This meeting was attended by a diversified group of registered professional engineers in the vicinity of Boise and much interest was evidenced in the affiliation of the Idaho Society with the National Society of Professional Engineers. At the annual meeting of the Idaho Society held last spring, the officers were authorized to take the necesary steps toward this affiliation. During the meeting in Boise, a resolution was unanimously adopted which when approved by the entire state body will be forwarded to the National Society as a formal request for the affiliation of this group.

A discussion of the program and organization of NSPE with several engineers in Butte brought forth the interesting observation that the new registration law in Montana, affecting, as it does, only civil engineers, will register only a minority of the engineers practicing in Montana. The Montana Engineering Society embraces all branches of the profession but does not require registration as a condition for any grade of membership.

Washington Law

The State of Washington has recently amended its state registration law to include all branches of engineering. At a dinner meeting of the Spokane Chapter of the Washington Society of Professional Engineers, the new law was outlined in detail by Mr. Edward C. Dohm, a member of the Registration Board, and the values of a national association of professional engineers together with the values of registration were outlined by your Executive Director. A number of engineers were in attendance who will now be able to be registered under the Washington law as well as a class of engineers-in-training now studying to take the registration examinations. National Director James C. McGivern, Dean of Engineering, Gonzaga University, presided at the meeting. The following day, your Executive Director met with the Executive Committee of the Spokane Chapter together with National Vice-President William L. Thrailkill, National Director McGivern, and State Secretary DeWitt C. Griffin. The programs of the National Society of Professional Engineers and the Washington State Society were discussed.

At a meeting in the New Washington Hotel in Seattle attended by members of the Seattle Section of the Washington Society of Professional Engineers and a number of prominent engineers of the Seattle Area, your Executive Director outlined the activities of NSPE and Mr. Dohm reviewed the new registration law for the state. The officers present at this meeting were State President J. O. Johnson and Chapter Secretary Honore Gerrodette.

Visits in California

The next stops on the trip included visits in California. The stop-over in Sacramento permitted short conversations with several of the members-at-large in this area and a visit to the Committee on Governmental Efficiency which was scheduled to hear debates on the new registration law for the State of California. Unfortunately, this was postponed.

Between fifteen and eighteen members of the Society residing in the San Francisco Bay Area met with your Executive Director at the St. Francis Hotel to discuss the possibility of a state organization in California. Considerable interest was evidenced and similar meetings in the San Francisco Bay Area are planned. A number of the members requested literature and information with which to interest associates in becoming members-at-large preparatory to the formation of a state society.

In Los Angeles, a similar group of about twenty NSPE members met with your Executive Director upon the invitation of Walter H. Hester, Production Manager of Baroid Sales Company. This group evidenced considerable interest in a state society and future meetings were scheduled for the purpose of inviting other interested engineers to become more fully acquainted with the activities of NSPE.

New Mexico Chartered

Your Executive Director had the extreme pleasure to award the charter of affiliation to the New Mexico Society of Professional Engineers at a dinner meeting in Albuquerque on May 28. This meeting was attended by nearly 150 charter members of the New Mexico Society and was addressed by Mr. Al Buck, Mayor of Albuquerque, a registered professional engineer and the 200th charter member of the New Mexico Society.

One observation is paramount as a result of this trip. It was found that in discussing the National Society of Professional Engineers with those who are not as yet members, there was considerable confusion and lack of information both as to the organizational structure of the Society as well as its aims and objectives. The promotion of NSPE in the West is largely dependent upon the dissemination of information in these areas and it is

(*Continued on next page*)

Coming Events To Remember

National Meetings

July 11—State Secretaries Conference, Statler Hotel, Washington, D. C.

July 12—NSPE Board of Directors Meeting, Statler Hotel, Washington, D. C.

(*Continued from preceding page*)

suggested that members of the Society who have occasion to visit these areas or have friends residing in states west of the Mississippi, call the attention of these individuals to the advantages of membership in NSPE.

Speakers Sought

The Washington Office has received a number of requests from interested groups of engineers for speakers to discuss the National Society. Requests have been received from the states of Utah, Louisiana, Tennessee, Arizona and Florida. This is another evidence of the increasing interest in the National Society.

Membership continues to grow at an encouraging rate. However, if we are to reach our goal in 1947, the rate of increase should be greater. Membership total as of June 1 was 15,763, showing an increase of 1,611 members since January 1 of this year.

Several members have stopped off in the Washington Office when business or pleasure brought them to the Nation's Capital. Among them were: Messrs. Hahn, Alger, Linville and Post of New York State Society; Mr. Barrows, the new Executive Secretary of the New York State Society; Mr. Leonard of the Minnesota Association; Mr. Ray Meehan, of Chicago, Chairman of the Nominating Committee; and Mr. Ranson, member of the Massachusetts Society.

ILLINOIS

The Illinois Society's Capital Chapter heard V. Y. Dallman, well known editor of Springfield's Illinois State Register, who spoke on the "Engineer and His Civic Duty."

Mr. Dallman discussed various phases of city governments and pointed to engineers as being builders of better civic character.

The editor pointed out the need for a civic auditorium in Springfield and suggested this as a worth while project in which engineers as a group might become interested.

In concluding his speech, Mr. Dallman appointed all Capital Chapter members as associate editors of the State Register and requested that they submit for publication any constructive ideas.

MASSACHUSETTS

At an April 15 meeting the North Shore Chapter of the Massachusetts Society of Profeesional Engineers received its state charter. The meeting was held in the main dining room of the Hotel Hawthorne in Salem.

Raymond C. Newton, president of the State Society presented the charter —the first to be awarded to a unit of the State organization. Acting chairman Edgar A. Harty received the charter on behalf of the chapter.

Guest speaker was William A. Ryan, NSPE director and official of Stone and Webster Company of Boston.

NEW YORK

The Niagara County Chapter has gone on record as favoring an amendment to the education law which would permit the granting of an engineering license to a candidate on the basis of (1) experience and (2) an oral examination if he meets all other requirements. The chapter favors such licenses for professional engineers having fifteen years experience.

Mr. C. S. Freeman of the Lincoln Electric Company spoke on the subject of arc welding, after which the meeting was shown sound motion pictures portraying the processes which he discussed.

Hamilton Mizer, city editor of the Niagara Falls Gazette, discussed pertinent community, state and national obligations of individual citizens in a talk entitled "Democracy's Failure."

The Westchester County Chapter held its annual election at its April meeting with the following results: Vincent G. Terenzio, president; Chester A. Garfield and William L. Wenzel, vice-presidents; Norman S. Odell, treasurer; Alex S. Traub, Jr., secretary; and John J. Balint, Ebbert Pearson and Raymond N. Poole, directors.

The Kings County Chapter held a meeting May 15, for the purpose of hearing reports from delegates who attended the 20th annual convention of the New York State Society.

The Chapter has also elected new officers as follows: Carl M. Gilt, president; Charles W. Mitchell and Gustave Freeman, vice-presidents; Irving J. Lake, secretary; and Paul Klepper, treasurer.

OHIO

The Cincinnati Chapter of the OSPE has run into a snag in the campaign to eliminate fraudulent and dubious listings in telephone directories under the heading "engineers."

The local telephone company refuses to establish a procedure such as has been set up in the Dayton area. Under this procedure, the local chapter of a member state society would maintain a check on listing under the "engineers" heading and call the fraudulent or dubious ones to the attention of the telephone company, which in turn would cooperate in trying to have them eliminated.

In the Cincinnati case, the local company indicates that A. T. & T. is involved not at all and the Ohio Bell system only in part. The company has served notice that the chapter will have to police its own profession in a manner similar to that of the American Medical Association and the American Bar Association.

This procedure will involve litigation, either at the state or local level. If it becomes necessary for this litigation to be carried on at the local level, it is felt that the Cincinnati chapter will have to incorporate.

The Dayton Chapter suggests as a topic for speakers, "The Engineer as an Expert Witness."

This topic was discussed at the Dayton group's last meeting and was so well received that President Allen of the Chapter has written suggesting the same topic for other chapters. Judge Robert V. Martin was the speaker.

The Ohio State Society Board of Trustees held its monthly meeting in the Seneca Hotel, Columbus, May 2.

The Membership Committee Chairman reported a total state membership of 3,280—an increase of 87 during the month of April. Franklin County is the largest chapter with 448 members.

The Legislative Committee reported that two hearings have been held on amendments to the Ohio Registration Act. The bill is now before a subcommittee of the State Legislature's Senate Judiciary Committee but, according to the OSPE Legislative Committee much work remains to be done if any action is to be taken on the bill.

The Public Relations Committee chairman outlined three immediate objectives for his group: (1) a campaign to get engineers into civic affairs; (2) a campaign of publicity for the profession; and (3) a campaign to sell the value of OSPE to non-members.

Two violations of engineering ethics are under investigation by the state's Committee on Grievances and Ethics.

The Board gave the committee authority to proceed on these cases, one of which is in Columbus and the other in Dayton.

The Marion Chapter of OSPE had a program presented by the Electromotive Corporation at its May meeting, consisting of a talk and motion pictures. The Electromotive Corporation, a subsidiary of General Motors, builds the 5,400 horsepower, diesel-electric locomotives used by the Erie Railroad. The motion picture showed construction and operation of the locomotives, particularly of the new 6,000 horsepower units which the firm is now manufacturing.

OKLAHOMA

In his message to members of the Oklahoma Society of Professional Engineers for May, L. L. Dresser, President of the State Society, makes the following statement:

"The public wants to know what engineers are doing towards the advancement of common welfare, so let's tell them. Inform them through our daily papers and our magazines in a true, constructive, and professional manner. Promote *engineers* as speakers at civic meetings. Don't let the politicians do it for us. Politicians are always doing things that are expedient for themselves or for their constituents' benefit whether or not they are economically practical. Help make your official magazine informative by supplying news of your district and articles of interest. Educate the public on the correct place of the *engineer* in the economic picture and take our place with other worthy professions. See that the professional and civic activities of the engineers, particularly the professional members of your society, are given publicity. When you accept a new member tell the Editor about it in your monthly report. Include a story about this new member; it is news for your society and will please the new member and make him feel that he is recognized and welcomed to our society."

PENNSYLVANIA

The Lincoln Chapter of PSPE held its May meeting at Safe Harbor with Mr. B. Van Ness, Jr., chief engineer of the Safe Harbor Water Power Corporation as speaker of the evening on the subject, "Power From A River." Mr. Van Ness is also Secretary of the Engineers Joint Council of Maryland.

Preceding the meeting, the chapter took an inspection trip through the Safe Harbor Hydroelectric Development.

The Philadelphia Chapter of the PSPE held elections at its May 1 meeting. The new officers are as follows: Gerhard J. Lauter, president; Lt. Col. Henry F. Bamberger and Harry R. Halloran, vice-presidents; H. E. Corl, secretary; George Cook, treasurer; and William A. Toperzer, Thomas C. Brown, Nelson Kriebel, Charles B. Broschart, and George H. Zeisler, directors.

The chapter reports a total membership of 538 and has set 1,000 members as its goal for next year at this time.

WASHINGTON

A new registration law for the State of Washington which was introduced in the legislature by Representative W. D. Shannon, who is himself an engineer, was recently signed by Governor Wallgren.

The new law is general, covering the practice of professional engineering and land surveying. The former statute merely governed the practice of civil, electrical, mechanical, structural and hydraulic engineering and land surveying. It did not cover mining engineers as does the new law.

Graduates of engineering schools, under the new Act, may take the theoretical part of their examinations immediately after graduation, thus providing for engineers-in-training. Only an oral examination will be required after they have completed the necessary practical experience for full registration.

George Krueger Appointed As Publication Head

Mr. C. George Krueger, NSPE National Director representing the New Jersey Society, has been appointed chairman of NSPE's Publications Committee.

Announcement of the appointment was made by Ritchie Lawrie, Jr., NSPE President, following the resignation of William H. Larkin from the post. Mr. Larkin's resignation came as a result of his election as President of the New York State Society.

Publication Experience

Mr. Krueger assumes his new post

C. George Krueger

Publications Chairman

with a broad background of experience in publication work. He is a Director of the *New Jersey Engineer,* official publication of the New Jersey State Society and has made an intensive survey of the policies and practices followed in publication of the *American Engineer.*

Mr. Krueger attended Dickinson High School, Jersey City, and received his technical education at Cooper Union and Brooklyn Polytechnic Institute. He has been an instructor in engineering subjects at Cooper Union and Pratt Institute.

He started his engineering career as a levelman with the Lehigh Valley Railroad, worked on design and construction of the Holland Tunnel Approach for New Jersey and has been associated with Airmap Corporation of America in preparation of aerial photographic maps and surveys. He has also engaged in construction and land subdivision in Florida, building alterations and management, and was associated with the design and construction of the Bayone and George Washington Bridge and the Lincoln Tunnel. He has also been engineer for the Port of New York Authority.

Labor Commissioner

At present Mr. Krueger is Deputy Commissioner of the New Jersey Department of Labor in charge of the Division of Safety and Engineering, Explosives and Industrial Equipment.

He is a past president of the New Jersey Society of Professional Engineers, an officer of the New Jersey Association of Safety Engineers and is recognized as an authority on the subject. He is also a member of the NSPE Executive Committee.

Mr. Krueger is married, has one daughter and resides with his family in Jersey City.

Registration Data Sent To Graduates

During the month of May the National Society of Profesional Engineers distributed over 20,000 pamphlets entitled "Registration of Professional Engineers" to 1947 graduating classes in engineering schools throughout the country.

This pamphlet contains basic information for engineering students on the meaning of legal registration, how it developed, the basis of registration, how to register and the results which may be expected from it.

The booklet is a reprint of an article which first appeared in "The Registration Bulletin" which is published by the National Council of State Boards of Engineering Examiners. The article was prepared for the Council by N. W. Dougherty, Dean of Engineering, University of Tennessee. Dean Daugherty is also Chairman of the Tennessee State Board Architectural and Engineering Examiners and is a past president of the NCSBEE.

Original distribution of the booklet was made by NSPE through its members state societies on the basis of estimated enrollment in engineering schools. However, following the original distribution NSPE's Washington office received many requests for bigger supplies than had originally been allocated, showing an intense interest among engineering schools and students in the subject of registration.

Atomic Problems For Engineers

The use of atomic energy for practical power production depends upon solution of many engineering problems which must be answered by the engineer and the nuclear physicist working together, Dr. Alfred O. C. Nier, professor of Physics at the University of Minnesota, told the semi-annual meeting of ASME recently in Chicago.

Dr. Nier was the first scientist to separate uranium 235. He did this in 1940. His topic for discussion before the ASME meeting was' "Some Nuclear Problems."

In a general statement of the problem, Dr. Nier pointed out that the construction of atomic reactors requires materials whose properties are largely unknown under operating conditions. New materials will have to be developed so that the greatest efficiency of operation will be achieved. In all of this work the engineer will have to take account of the nuclear properties of materiasl as well as properties already known.

Among the problems enumerated by Dr. Neir are: development of a shield that must be provided against the death dealing emanations from the atomic power plant; development of methods for the removal of waste products from any practical atomic "furnace"; and selection of a moderator—a medium by which fast neutrons produced in fission are slowed down in order to set up a chain reaction.

In conclusion, Dr. Nier said: "The problem of producing atomic energy is largely one of making efficient use of neutrons. This and the concept of atomic fission are really the only basically new factors with which the engineer must contend. Otherwise the problem of producing atomic energy involves merely modifications of problems which engineers have already solved or will solve in connection with other work.

There are many developments which will go hand in hand with those already being carried on in industry, and engineers can make substantial contributions toward making atomic energy an every-day reality by merely extending the scope of their operations.

Congress Overrides Labor Bill Veto

As this issue of the *American Engineer* is going to press Congress has just passed the Hartley-Taft bill amending the National Labor Relations Act over the President's veto.

The votes in both the House of Representatives and the Senate were solidly in favor of the bill, and allowing wide margins over and above the required two-thirds for an override. In the House the vote was 331 to 83 and in the Senate 68 to 25.

The bill which has now become law contains significant provisions for engineers and other professional employees. For the first time since the passage of the original Labor Relations Act engineers as such will have the right to choose representatives for collective bargaining who do not also represent unskilled and skilled workers. It will be possible for engineers to have their own representatives whose major concern will be engineers and their welfare, rather than the welfare of many different types of workers including unskilled and professionals.

The new law, according to many competent observers, affords the engineering profession a great opportunity. It opens the way, it is believed, for full professional development and elimination of the stigma of "technician" which has been attached by large segments of the public to engineers as a group.

Consequently, it is important that this new law be studied and analyzed by the profession. Engineers who are employed in industry will want in many instances to take advantage of the new privilege which they are allowed under the new law.

Consequently, NSPE has made arrangements to send copies of this new law to persons who request it together with a copy of the "Manual on Collective Bargaining for Professional Employees."

The Manual, which sells for one dollar ($1.00) per copy, analyzes the essential features of the National Labor Relations Act, prior to the passage of the Taft-Hartley amendments, including the rights guaranteed employees, a comparison of the advantages and disadvantages of various types of labor organizations, and discusses conditions which must be met and steps which must be taken and responsibilities involved in the establishment of bargaining organization.

As a basic source book, the Manual provides the professional employee with the background against which he must interpret and appraise his relationship to other employees. Read in conjunction with the new law, it provides an up to the minute means of analyzing the current situation and its relationship to the professional engineer.

(Your copy of the Manual on Collective Bargaining—The National Labor Relations Act and Professional Employees, together with a copy of the recently enacted amendments to the National Labor Relations Act, may be obtained now from the National Society of Professional Engineers, 1359 Connecticut Avenue, Washington 6, D. C., or through the NSPE State Societies. Price one dollar.)

What's New For Engineers

Requests for further information concerning any item mentioned under this heading will be promptly referred to the manufacturer. It would be appreciated if inquiries be addressed on professional or company letterhead.

Send Inquiries Direct to American Engineer, #6 Church Street, New York, N. Y.

FREE SAMPLES OF NEW HAND CLEANER

To prove how effectively this *new* Hand Cleaner removes crude oil, grease, tar, gum, varnish, creosote, printers' ink and almost any substance not soluble in water — a neatly packaged free sample is offered to all who request one. A small dab rubbed into the hands like ordinary soap and wiped off on a paper towel or rag will remove all traces of dirt and grime from the hands within a few seconds.

Scrubbing and scouring is never necessary. The new Hand Cleaner dissolves dirt in one application. It contains Senna, a medicinal herb for soothing cuts, scratches and abrasions. Devoid of water, it protects hands from chapping and is ideal for use in cold freezing climates where moisture cracks the skin. A little on a rag keeps tool handles free from oil and grease. Especially recommended for mechanics, machinists, oil field workers, painters, roofers, printers and those in kindred trades. Packaged in one and five pound cans. Write for free sample today.

For further information address American Engineer, reference No. 618.

"STREAMLINE GRAPHICS"

Streamlining, today, is of great technical importance to the airplane, automotive, and ship industries, and of aesthetic and sales significance to the producers of articles of many types. To increase knowledge on this subject and to provide an informative manual of the mathematical and graphical factors involved, the Georgia Tech Engineering Experiment Station has released a new bulletin entitled "Streamline Graphics," written by Joseph P. Vidosic, associate professor of engineering drawing and mechanics.

Streamline graphics, which had its industrial birth in the automotive industry, calls for the application of mathematical and graphical analyses. The Georgia Tech bulletin, after describing aircraft practices, deals extensively with these subjects and presents a number of examples and solutions, in order to demonstrate the principles explained.

For further information address American Engineer, reference No. 619.

SELF-LOCKING WING NUT

A new self-locking Wing Nut, featuring a red elastic nylon locking collar, has been produced. It was developed to answer design requirements calling for the convenience of a wing nut, plus the ability to lock in position anywhere on a bolt or stud.

Potential applications of the Self-locking Wing Nut are said to exist on automobiles and trucks, industrial equipment and special machinery of all kinds or on any assembly where adjustability and removability are required.

The wing nuts are made avaialble in four diameters with both fine and coarse threads. Machine screw sizes, in fine threads, are 8/36, 10/32 and 12/28, with the fractional size of 1/4-28. Coarse thread sizes are 8/32, 10/24 and 12/24, in addition to 1/4-20.

The locking torque characteristics of these wing nuts have been tested under severe conditions and retention of locking effectiveness through 200 applications and removals has been shown.

The wing nuts are made of die-cast zinc, with all nuts in regular produc-

The wing nuts are made available plating can be furnished on special order.

For further information address American Engineer, reference No. 620.

ELECTRIC ARC STUD WELDING

A new 36-page 2-color bulletin, describing the application of stud welding in the construction industries, has just been published.

A wide range of studs, used for securing corrugated asbestos and other types of roofing and siding, metal lath, insulation, and other integral construction materials, to structural steel frames, is shown along with various types used in the installation of mechanical, electrical, and sprinkler equipment.

Studs are now being widely used for securing pipe, wire-ways, and other electrical equipment to structural steel, as well as in the installation of sprinkler lines, for which a special female-type stud has been developed.

For further information address American Engineer, reference No. 621.

DIGEST OF STEELS FOR HIGH TEMPERATURE SERVICE

This is the fifth edition of this monumental work. Originally published in 1932 and revised in 1934, 1937 and 1937, it presents complete high temperature data on twenty-two steels which have found general use in many different types of applications. Each of these steels are first considered individually in detail after which, in the Summary, their most important physical properties are presented in such form as to be readily compared so that the design and operating engineers may make the most economical selection for the particular problem at hand.

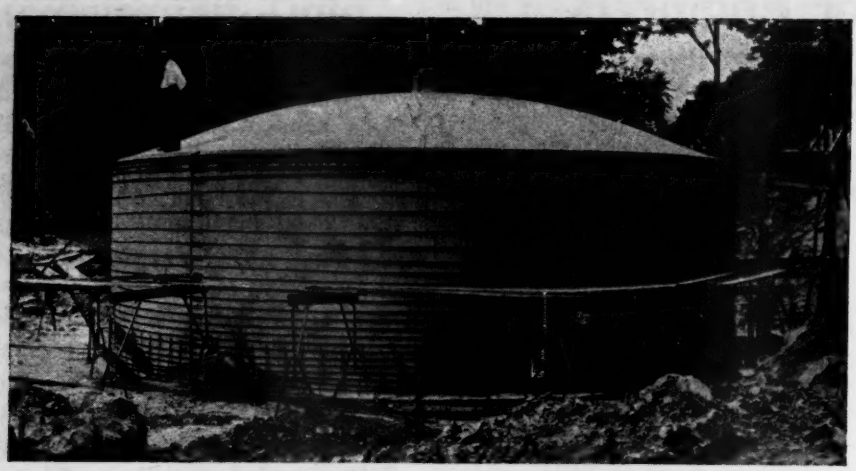
The problem of selecting economical steels for use at elevated temperatures requires not only a knowledge of the strength and stability of the materials under stress at high temperatures, but also a knowledge of their resistance to oxidation and corrosion. Consequently, data with respect to each of these characteristics are included. Likewise, since there is not as yet complete agreement as to which of the high temperature strength characteristics is most suitable for design purposes, information is given with respect to all three, namely, the short-time high temperature tensile strength, the rupture strength, and the creep resistance.

All test pieces used in securing the data presented in this book were taken from commercial heats, portions of which were processed into finished tubing. No experimental melts were used. As is true with all physical test results, there will be some variations from heat to heat, but the data presented are typical. They should not be considered as minimum or maximum, but rather as a commercial average such as would be obtained from production heats of each individual specification.

The book contains 216 pages and is profusely illustrated with photographs showing the microstructures of the various test specimens discussed.

Owing to the high cost of producing this book *it will only be sent to design and operating engineers who request it on their company or professional letterheads giving their connections and positions.* Each book is numbered and supplementary data will be available from time to time. This data will be sent free to those engineers whose positions qualify them to receive the book.

For further information address American Engineer, reference No. 622.



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This photo illustrates our method of pre-stressing the hoop rods by means of several turnbuckles in each hoop.

Our Bulletin E2300 describes and illustrates pre-stressed "GUNITE" construction in detail and also scores of other uses of "GUNITE."

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SPRING NUTS AND SPRING LOCK NUTS

A new type of Spring Nut and a new Spring Lock Nut has just been placed on the market.

It replaces the conventional nut and, according to the maker, in one assembly operation assures a positive locking action on the bolt. The new Spring Nut not only saves assembling operations, but offers a worthwhile saving over the cost of the conventional nut.

This revolutionary new fastening device is made in two types. One replaces the conventional nut. The other is made to supply action similar to a lock nut.

The Spring Nut has all the advantages of a regular nut and is adaptable for use in "hopper-feeders" and various types of power wrenches. Because of precision manufacturing, it is said to have greater gripping power on the threads of a screw or bolt and, therefore, resists loosening.

To engineers, designers and production executives a folder giving the complete details, data charts, weights, etc., will be sent upon request.

For further information address American Engineer, reference No. 623.

Wendel Willkie may have been right about this being "One World," in the sense that a cocoanut is one nut. Those who have tried to crack a cocoanut know it is mostly husk and not much "meat."

We probably need a type of social organization in which a surplus of useful goods would mean prosperity instead of stagnation and poverty as at present.

The Devil's power is due to the good he manages to mix with his evil; a good man's weakness consists of the bad he mixes with his goodness.

—Mark Twain

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The wide usage of Diesel Electric Sets, which in many instances has brought upward steps in living standards, is described by words and in pictures in a new 16-page, 2-color bulletin just off the press.

The bulletin stresses the use of Diesel Electric Sets by small communities, manufacturers, mines, mills, service stations, tourist camps, logging camps, airports, radio stations, printing plants, etc., and the fact that there is a type and size set available for practically every electrical need.

For further information address American Engineer, reference No. 624.

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